

Description

RISER FOR NARROW CARVING SKIS

BACKGROUND OF INVENTION

[0001] *1. Field of Invention*

[0002] The invention relates to the field of alpine skiing, and in particular to a riser for skis in which the base of the ski is narrower than the top of the ski.

[0003] *2. Background of Invention*

[0004] Conventional skis have a built-in turning radius of over 100 feet. This radius is so long that most skiers find great difficulty in making true carved turns. Certain carving skis overcome this difficulty by having extra wide shovels and heels, with narrow waists. These result in skis having built-in turning radii on the order of 33 to 66 feet (10 m to 20 m). Such skis allow controlled descents by most skiers. Almost all present-day skis are carving skis of this type. A typical wide carving ski of length 180cm has the dimensions 115, 65, and 90 mm at the shovel, waist, and tail, respectively, as compared to 85, 65, and 75 mm for

conventional skis. Wide carving skis are more stable than conventional skis in deep powder snow, but are sometimes more clumsy in transfer of the skier's weight during turns.

[0005] There is a second design for a carving ski with short turn radius: the waist of the ski is made narrower than conventional skis to form the deep side cuts required to achieve a short turning radius. Unlike wide carving skis, the width of the shovel and tail of this second design are similar to those of conventional skis, but the base of the ski is narrower than ordinary skis. Typical widths of the bottom of the ski are 85, 35, and 75 mm. The narrow waist gives a nominal turn radius on the order of 50 feet (15 m), similar to that of the wide carving skis.

[0006] However, the minimum width required to install bindings on skis is about 55 to 60 mm, significantly wider than the bottom of narrow carving skis. Therefore, a riser with outwardly flared sides is required to provide an ample width for the bindings. This leads to another consideration: the skis can become unstable when the ski is turned on its edge, as the top of the ski digs into the slope. To overcome this problem, the riser must elevate the top of the ski so that it does not touch the snow. Bootout, wherein

the skier's boot touches the slope, occurs at slope angles of about 70 degrees on almost all kinds of skis. Therefore, it is important that the riser is sufficiently thick so that the top of the ski does not touch the slope at angles less than 70 degrees.

[0007] In addition, the riser should be formed so that it is integrated into the rest of the ski. It should extend over most the active portion of the ski between the shovel and the tail, and further, be shaped so that it provides a smooth transition as the ski is turned on its edge during traverses and turns.

[0008] Skis in which the base is narrower than the top have a distinct advantage over conventional skis and wide carving skis: the lever arm formed between the applied force and the base of the ski is significantly smaller. This smaller lever arm magnifies the forces applied by the skier during turns, and this mechanical advantage gives the skier greater control and power. In addition, narrow carving skis are much quicker in the transition from edge to edge.

[0009] Narrow carving skis must be significantly thicker in the vicinity of the bindings than other skis. This additional thickness has two beneficial side effects: the greater elevation of the boot above the base of the ski, combined

with the smaller lever arm, gives the skier greater control; and the thickness variation of the ski plus riser provides a more optimum force distribution during skiing, approaching that calculated by Deborde, et al. (patent no. 6499759, Dec. 2002).

[0010] *3. Prior Art*

[0011] The first US patent for wide carving skis was awarded Apr. 1995 to Petkov (patent no. 5405161). Almost all modern skis have dimensions similar to those of Petkov for the shovel, tail, and waist.

[0012] The first patent for narrow carving skis was awarded Apr. 1994 to Harper, et al. (patent no. 5303949). This design provided sufficiently short turn radii to fulfill its desired purpose of enabling true carved turns of short radius. In 1998, Elan Ski Company brought out the Stealth ski, also a narrow carving ski based on this patent and on patent SL9700021A (inventor: P. Tomaz, et al.). A riser supporting the bindings was attached in the waist area of the ski, extending some 30 cm fore and aft of the bindings. The riser of the present invention differs in width, thickness, overall shape, and construction from the Elan riser.

SUMMARY OF INVENTION

[0013] The present invention is designed to provide an optimum form for the riser; one that will maximize the range of stability of narrow carving skis. The riser has outwardly sloping sidewalls that provide a suitable width at the top of the ski for attaching bindings, and the thickness of the riser elevates the top of the ski a sufficient distance so that the top of the ski does not dig into the slope. In the preferred embodiment described below, slope plus angulation angles greater than 75 degrees can be accommodated (the critical angle above which a ski is unstable is designated alpha in this document). Satisfying this requirement results in a ski that is thicker in the waist area than for conventional skis and wide carving ski: the thickness in the preferred embodiment typically is up to 50 mm (two inches) for 180 cm skis.

[0014] Within the ski itself, angle alpha is defined as the angle between the tangent line drawn between the top and bottom edges of the ski, and a surface line tangent to the bottom of the ski, both lines being in the same vertical plane perpendicular to the long axis of the ski. Required riser thickness for any desired angle alpha can be found by using an equation that relates the side cuts of the top of the ski (about 7 mm, as in a conventional ski) and the

bottom of the ski, to the angle α . This equation gives the thickness of the riser at any point along its length that is required for any given angle α .

[0015] The additional requirement that the riser should form an integral part of the ski, and extend over a significant part of the active area of the ski between shovel and tail, is met in the present design. This allows a smoother transition between the ski and the slope as the angle between the ski and the slope increases during a turn.

[0016] The basal section of the ski, which has the same thickness dimensions as a conventional ski, has vertical sidewalls. Therefore, the base of the riser resting on the basal section of the ski has the same shape as the base of the ski. Above this, the sidewalls of the riser are cut at a constant angle of about 60 degrees in one of the preferred embodiments described below.

[0017] The sidewalls of the riser can be made either planar or some regular curve that will create a concavity in the surface of the sidewalls. This concavity must not be so pronounced that it substantially reduces the thickness of the portion of the riser that will be penetrated by binder fastening screws. In all cases, the sidewalls of the riser should preferentially form a smooth curve from front to

back so that there is a streamlined flow of the ski through the snow. A smooth curve results naturally when the riser is cut at substantially the same angle from front to rear. The riser, within 2–3 mm of its top, can be cut vertically so that it does not form a sharp edge along the top of the ski.

[0018] The two members of the present ski are designed to be formed together in the manufacturing process.

BRIEF DESCRIPTION OF DRAWINGS

[0019] For a more intuitive understanding of the nature and objects of the invention, reference is made to the following detailed description and the accompanying drawings, in which:

[0020] Fig. 1 is a plan view of the bottom of the ski.

[0021] Fig. 2 is a side view of the ski.

[0022] Figs. 3, 4, 5 and 6 are cross-sections taken along the corresponding lines of Fig. 1.

[0023] Similar reference numerals refer to similar parts throughout the several views of the drawings. The figures are of a preferred embodiment and are indications only of the range of possible values for the specific elements of the invention.

DETAILED DESCRIPTION

- [0024] Fig. 1, a bottom view of one of a pair of identical skis, incorporates the principles of the present invention. As in conventional skis, this ski has a shovel 7 at the front end, a heel 8 at the tail, and, between the two, the running surface 9. Bottom edges of the ski are at 10 and 10', and top edges are at 11 and 11'.
- [0025] The riser, along with its relation to other parts of the ski, is shown in the side view, Fig. 2. The basal section of the ski with vertical sidewalls is at 12, and the riser is at 13.
- [0026] Cross-sections of the ski, Figs. 3, 4, 5, and 6, are located at intervals along the ski as indicated on Fig. 1. They begin near the front of the ski, and extend progressively toward the area of the bindings at Fig. 6. It should be noted that cross-sections taken between the bindings and the heel of the ski would be similar to Figs. 6, 5, 4, and 3.
- [0027] Turning now to Fig. 6, edges 10 and 10' are shown on the bottom of the ski, and said edges are linked to the riser 13 by vertical sidewalls 12 and 12'. Because of this verticality, the bottom of the riser will necessarily have the same shape as the bottom of the ski itself, over that part of the ski that the riser covers. The sidewalls of the riser, 13 in figures 1 and 2, and 13 and 13' in figures 3 through

6, are cut at a large angle beta that in the preferred embodiment shown in Figures 4, 5, and 6 is about 60 degrees. Angle beta is the acute angle formed between the riser walls and the base of the riser, measured in a vertical plane perpendicular to the long axis of the ski. This angle in turn controls angle alpha shown in Fig. 6. Angle alpha is a critical angle and in all embodiments should preferentially be 75 degrees or more.

[0028] It will be noted that angle alpha is 90 degrees in front of and behind the riser.

[0029] The purpose of the invention is to make it possible to have deep side cuts and therefore shorter turning radii than those of conventional skis, while retaining the aesthetically pleasing form and stability of conventional skis. The riser provides the basis for these objectives, and provides, in addition, flotation and added control for carved turns.

[0030] It will be obvious to a person skilled in the art that further designs of the form of the riser are possible within the scope of the invention and that they need not be limited to those particular measurements illustrated within the text and the figures.